

## **Contributing knowledge and knowledge workers: the role of Chinese universities in the knowledge economy**

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As China has appeared only recently as an important knowledge producer with growing global economic significance, little is known internationally about how these processes develop and are managed within China. The rapidly expanding Chinese higher education system is playing an increasingly important role in China's knowledge economy and therefore in the global knowledge society. This paper reviews historically the changing role of Chinese universities from the planned economy to the knowledge economy, analyses their contribution of knowledge and knowledge workers, and critically reflects on the mechanisms driving or confining their future contribution to the knowledge economy.

**Keywords:** China; university; knowledge economy; knowledge production; knowledge worker

### **Introduction**

The knowledge economy is defined by Powell and Snellman (2004) as production and services based on knowledge-intensive activities. In the current knowledge economy, the relationship between knowledge and wealth has been significantly highlighted, tightened, and materialised. It is a time of opportunity and threat for the university.

The university institution has survived, together with the church, as one of the oldest western institutions. Its roles have evolved across times and nations from cultivating gentlemen in Newman's ideal, the Humboldtian promotion of science and scholarship, to Kerr's teaching–research–service uses of the 'multiversity', and then to be a vital engine for the global knowledge economy (Barnett 1994; Delanty 2001). In the era of the knowledge economy, the understanding of knowledge is said to be narrowed to what can bring profit and have a direct contribution to economic growth (Foray and Hargreaves 2003). Although arguably losing its monopoly over knowledge production (Gibbons et al. 1994), the university (especially the global research university) does not easily give up the power and influence it exerts through teaching, research and service. With the rise of academic capitalism and entrepreneurship (Clark 1998; Slaughter and Leslie 1997; Slaughter and Rhoades 2004), the university is reclaiming its impact and significance in the knowledge economy. One telling indication of this is the global phenomenon of building 'world-class universities' among major developed and developing countries in the last decade.

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The Chinese higher education system is now the world largest in size since it began to expand in 1999, with over 23 million registered university students in 2010. The Chinese higher education system therefore faces the task of preparing the world's largest national group of future knowledge workers and supporting the knowledge economy with knowledge production by research and knowledge transfer.

This paper provides a historical overview of how Chinese universities have changed from knowledge dissemination and training personnel resources under the planned economy to knowledge production and transfer driving the knowledge economy in China. It identifies the contribution of universities in China from people and knowledge, as well as the incentives and mechanisms introduced by the state and market to drive their role transit and shape their contribution to the knowledge economy.

### **The changing role of universities in China: from the planned economy to the knowledge economy**

Since the establishment of the first modern university in China in the late nineteenth century, Chinese universities have carried a mission of rejuvenating the nation. The purpose of the Chinese university has been directed more towards the functional and technocratic development of society than for knowledge as an end in itself. The past 60 years witness the functional transition of Chinese universities from training elite cadre corresponding to the national plan of personnel to cultivating knowledge workers responding to the labour market. At the same time Chinese universities transformed from pure educational institutions deprived of research function to the essential institutions holding strong foundational research driving the formation of the knowledge economy in China.

#### ***1949–1976: the destructive legacy of the former Soviet model and of the Cultural Revolution***

In this period universities in China were restructured into a political apparatus and an economic instrument for socialist political and economic development. Academic freedom and institutional autonomy over knowledge production were removed from universities. The value of knowledge was scrutinised and judged according to political ideology and its instrumental uses.

After the establishment of the New China by the Chinese Communist Party in 1949, universities in China followed the Soviet model of reorganising academic disciplines and separating teaching from research (Hsu 1964). Comprehensive universities were dismantled and divided into specialist colleges, covering science and technology, medicine, law, and so on. Universities at that time were regarded as the higher institutes for teaching and cultivating 'red and expert' specialised personnel for the socialist planned economy (Hayhoe 1999). Undergraduate specialisations (*zhuanye*) were closely coupled with the demands of personnel for jobs in different economic sectors, as managed by the central and local planning departments (Chen 2006). At the same time, research and publication activities in universities were separated out and merged into independent research institutes, such as those run by the Chinese Academy of Science (CAS). Universities were restructured solely for teaching, and research institutes for research. This destructive legacy of dividing teaching and research can be found today in the weaker contribution of universities to knowledge production compared with that of research institutes in China. Plagued further by the Cultural Revolution, Chinese universities became almost dysfunctional and the Chi-

nese intellectuals in universities were weakened in their ability to create and disseminate knowledge (Ogden 1982).

***1977–1997: second reorganisation of the university and its paradoxical development in economic transition***

With the advent of the ‘Reform and open-up policy’ and the recovery from the Cultural Revolution, Chinese universities regained room for development with an increased degree of autonomy granted by the state (Yang, Vidovich, and Currie 2007). In the mid 1990s, there was a reverse reorganisation of Chinese universities, where the former divided and specialised colleges were encouraged to merge into large-scale comprehensive universities. However, the nature of muddling through in the economic transition and the retreat of the state in terms of public finance created a challenge for Chinese universities trying to serve state and society at the same time. Market, state and their intricate relationship, have shaped the role and impact of the university in China. Ways of turning knowledge into money were restricted to teaching non-degree self-financing programmes and establishing university-affiliated enterprises (*xiaoban qiye*). Universities were pushed to the market to generate revenue, but the conversion of knowledge into wealth was not established nor institutionalised.

Immediately after the Cultural Revolution, the 1978 National Science Conference and the subsequent educational reform policies of the 1980s helped release universities and intellectuals from ideological–political struggles. Teaching and research were restored gradually on campus. But the economic transition from the command model to the market forced universities to undertake market-like engagement in revenue generation in order to maintain modest incomes for their academic staffs. Compared with other campus businesses, such as selling books or commercial goods, work with knowledge creation and dissemination was largely devalued. Despite being state-owned, public money was shrinking in general to about half of total university expenditures. Students started to pay tuition fees and were no longer allocated to a guaranteed job post after graduation. People in the universities were distracted from their essential tasks of producing and disseminating knowledge; as a result, university involvement in revenue generation came to be criticised as a malaise of higher education marketisation in China (Lo and Chen 2004; Yin and White 1994).

During the late 1980s and early 1990s, university-affiliated enterprises grew and prospered in the name of generating revenue to support universities. Some were just trading and running businesses with no reference to knowledge and technology, whereas some took advantage of research and knowledge application from researchers in the university. One salient example in Beijing was known as the Peking University Founder Group, which was affiliated to Peking University and established itself first by applying the innovative publishing technology created by Professor Wang Xuan. The Zhongguancun area emerged in the 1990s first as a market of PC, and later as China’s Silicon Valley, national centre of information technology and knowledge innovation, surrounded by key universities and national research institutes.

***1998–2010: the expansion of higher education and the recognition of the value of knowledge in the knowledge economy***

The Internet became popular in China in the late 1990s. Information technology changed the world and created new riches in China where IT companies received venture capital investment and became listed on NASDAQ from 2000. The majority of the IT business leaders and the entrepreneurs of the hi-tech start-ups are graduates from the key Chinese universi-

ties, like Tsinghua University, Peking University and China Science and Technology University. They made fortunes out of nothing but knowledge, innovative ideas and technology, like Bill Gates and the founders of Google. The global information society and the knowledge economy – those abstract concepts – became to the Chinese public the visible alchemy of turning knowledge into wealth, with real Chinese examples available. The connection between universities and the new economy was highlighted and became included in the discourse of the knowledge economy. Knowledge production and transfer were no longer peripheral services as one of three uses of the university (Kerr 1995) but an essential source of economic growth and wealth creation, which is fully recognised by the Chinese leaders after the Asian Economic Crisis in 1997.

At the same time, a new national strategic project, named the 985 Project, was initiated, which was named in May 1998 when the past Party chairman Jiang Zeming made a speech on the occasion of the centennial of the establishment of Peking University, one of the most prestigious universities in China. Both Peking University and Tsinghua University were given handsome extra resources (1.8 billion RMB over first three years) to turn themselves into ‘world-class universities’. One of the key features of the world-class university was identified as research-intensive. As a result, key universities in China were supported and expected by the state to develop missions focused on research and knowledge creation rather than simply teaching.

In 1999 Ministry of Education in China suddenly increased higher education enrollment by 50% and continued to expand enrolment to an extraordinary extent over the next ten years. The expansion of higher education is based on the prevailing idea in Chinese education policy: turning its population size into an asset through the development of human capital (Levin and Xu 2006). More people in universities, it is believed, means more human capital generated to support the knowledge economy and to meet global competition.

### **Chinese universities contributing knowledge via research activities and outputs**

Knowledge is core to the university. The engrained tradition of teaching–research–service trinity in the university is the activities of disseminating, creating and applying knowledge. In the knowledge economy, Chinese universities are actively contributing knowledge via research output and knowledge transfer, which are usually measured by R&D activities and output. The state continuously generates financial and symbolic incentives and supporting mechanisms to accelerate knowledge production and transfer in the university. Although it is unlikely to rival the impact with the R&D in the business, Chinese universities make a significant contribution in the basic and applied research.

According to the OECD (2008), the definition of research and development (R&D) refers to ‘creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications’. In China’s R&D statistics (Department of Development and Planning MOST 2009), R&D activities cover two major terrains of knowledge: hard knowledge produced by science, engineering and technology, agriculture and medical sciences; and soft knowledge created mainly by the humanities and social sciences. The proportion of R&D funding in 2008 for these fields in universities varied significantly: engineering received 62.7% of the total, sciences 17%, medicine 8.4%, agricultural science 6.5%, and social sciences and arts 5.4%. However, these allocations should not be interpreted as impact measures or quantified contribution to the knowledge economy: there is no such a valid indicator yet created.

In line with the division into hard and soft knowledge, types of R&D output varied as well. The categories used by *China education yearbook* to account for the impact of science and technological research (S&T) are monographs published, academic papers, awards (especially national awards), technology transfer (contracts signed and income), patents granted and transacted patents (number and income). Those for research in humanities and social sciences (H&SS) are papers in academic journals (local and international) and applications (usually in form of policy suggestions).

### ***Incentives and mechanisms***

Developing scientific knowledge in and out of the university has widely been recognised by the state and the general public as of strategic and instrumental values to national strength and security (Baark 2001), while knowledge of humanities and social sciences was undermined and prohibited by the ruling Chinese Communist Party (CCP) in certain periods of ideological struggles and political turbulence in China. In the new century and with the increasing awareness of the importance of knowledge in global competition, the Chinese government started to invest strategically in research universities with numerous revenue streams. It was assumed that those prestigious universities would lead knowledge creation, application and the national innovation system. The prioritised investment would then produce spill over to other lower-level universities.

In addition to financial resources allocated to research projects and researchers in universities, various awards have been created to support and encourage significant knowledge production, for example National Research Projects, National Key Laboratories, National Key Projects of Basic Research, National Research Bases of Humanities and Social Sciences, and National Awards of University Science and Technology. The titles and awards drove universities and academics to submit competitive applications and evaluations for securing their reputations and recognition from the state (Chen 2006). Moreover, the competition for funding and accountability required in the process of carrying on the research projects reinforced the technology of performativity over academics and universities (Barnett 1994; Ball 2006). Effective indirect state control has been successfully established with its support to research.

### ***Strong basic and applied research recognised by the state and the industry***

Data from national R&D statistics do not give a full picture of what Chinese universities might contribute to the knowledge economy. They reflect, rather, the current limited role of the university in knowledge production and application (although not in basic research and theoretical knowledge production) when compared with specialist research institutes and businesses.

When the breakdown of R&D expenditure by research activities (basic research, applied research and experimental development) is examined, the university in China contributes mainly to fundamental, or basic, research, and to applied research. Among the R&D funding received by higher education in China in 2009, 31.1% was used for basic research and 53.4% on applied research (MOST 2010).

Another strong piece of evidence pointing to the dominant status of universities in basic research is that Chinese universities published 65.6% of domestic science and technology papers in 2009 (MOST 2010). Moreover, the impact of Chinese universities on industrial innovation is increasingly visible. Around 50–60% of R&D support to universities is given by government, but the share from business and enterprises has risen from around 20% in

1990 to over 30% in 2009. This increased share of support from business indicates the rising interests and recognition of university research activities by enterprises interested in knowledge transfer and application. In all, Chinese universities have received acknowledgment of their strengths in producing theoretical and applied knowledge by both the state and industry.

### Chinese universities contributing knowledge workers

There are two types of human resources closely related to universities in the knowledge economy: one is the student, who is processed by universities for future employment in the knowledge society; and the other is the academic based in universities (Dahlman and Aubert 2001; Santiago et al. 2008). The volume and type of human capital for the knowledge society in China are described below and their possible contributions analysed.

### University students and graduates: employment and young entrepreneurs

The first cohort of the university students under the 1999 higher education expansion, who graduated in 2003 with bachelor degrees, numbered 1,877,500. By 2009, the number of those graduating had nearly doubled to 5,119,500. Engineering and management are the two largest fields, with over 50% of graduates (Table 1). Students and their parents have been sensitive to the changing marketability of undergraduate programmes in the labour market and the fields of engineering and management are viewed as major contributors to the knowledge economy and so ideal in this respect.

Since the mid 1990s, university students have lost the privilege of a guaranteed job assigned by the state upon graduation. Instead, in addition to seeking a job in the labour market, self-employment and entrepreneurship of start-ups are highly recommended to university students. The case of *Shimeile*, a hi-tech start-up by Tsinghua University students in 1999, marked the beginning of student entrepreneurship in Chinese universities, by turning innovative technology into a business which was interested and invested by venture capital. This was endorsed by the Ministry of Education, following a policy of allowing university students to interrupt their study in order to realise their business plans.

Table 1. Number and percentage of university graduates by fields of study in China, 2003 and 2009.

| Year<br>Fields | 2003 graduates |            | 2009 graduates |            |
|----------------|----------------|------------|----------------|------------|
|                | Number         | Percentage | Number         | Percentage |
| All graduates  | 1,877,500      | 100%       | 5,311,000      | 100%       |
| Sciences       | 173,000        | 9.2%       | 266,000        | 5.0%       |
| Engineering    | 644,100        | 34.3%      | 1,918,400      | 36.1%      |
| Agriculture    | 50,100         | 2.7%       | 97,400         | 1.8%       |
| Medicine       | 111,400        | 5.9%       | 390,500        | 7.3%       |
| Management     | 281,300        | 15.0%      | 1,047,100      | 19.7%      |
| Philosophy     | 1,200          | 0.1%       | 1,700          | 0.03%      |
| Economics      | 88,200         | 4.7%       | 258,300        | 4.9%       |
| Law            | 110,400        | 5.9%       | 200,900        | 3.8%       |
| Education      | 117,100        | 6.2%       | 328,400        | 6.2%       |
| Literature     | 286,900        | 15.3%      | 788,700        | 14.9%      |
| History        | 13,900         | 0.7%       | 13,500         | 0.25%      |

Note: Due to rounding rows may not add to 100%. Source: MOST (2004, 2010).

Reinforced by a CCP policy in 2007, the entrepreneurship of university students has been highlighted as supporting state policy directives to create job opportunities through innovation and entrepreneurship. University students were able to tap resources and obtain entrepreneurship education and training from ‘Youth Business China’, an activity supervised by the Chinese Communist Youth League (*tuan zhongyang*), through university science parks, and through the ‘Leading University Student Entrepreneurship Project’ of the Ministry of Human Resources and Social Security.

At the same time, the pool of research students has been continuously enlarging as the number of undergraduates has grown. The number of research students is given by status of students in selected years (Table 2). The year 1999 marked the start of higher education expansion. The first cohort of the expansion was admitted to masters programmes graduated in 2002, and to PhD programs in 2005. There are currently 796 institutions which are approved to grant higher degrees, an increase from 408 in 2002 (MOE nd). In 10 years, the number of annual PhD degree recipients grew by 390%, and new master’s degree holders by 650%.

Most master’s degree programmes are research-oriented and usually involve three years of study. National research institutes, like those under the Chinese Academy of Science, have research students, which account for 1% of all research students in China. In this sense, universities in China play a dominant role in producing high level knowledge worker for knowledge economy. However it is noteworthy that the unemployment rate of university graduates has rapidly emerged as a social problem which might do harm to the development of the knowledge economy (Bai 2006).

### **Academics and researchers: changing motivations**

Along with the expansion of student population in the Chinese universities, the number of university teachers in 2009 increased by 144% against that in 2001 (MOE nd). By 2009 full-time university teachers from fields of science, engineering, agriculture and medicine account for almost 50% of the total academic staff in Chinese universities (MOE nd). The general category of science and technology, which is used by the China’s Ministry of Education and includes disciplines under science, engineering, agriculture and medicine. In this sense, almost half of the university academics are involved with science and technology which is usually understood in China as core knowledge for the knowledge economy (Baark 2007; Conroy 1989; Simon 1989).

Not only the number of researchers is rising but also the working culture in Chinese universities is oriented to more research than teaching. Chinese universities experienced two contradictory institutional reorganisation trends – to be divided and to be merged. Academic freedom and institutional autonomy were seriously plagued by the competing logics of

Table 2. Higher degree students from Chinese universities in selected years, 1999–2009.

| Students        | Year    |         |         |           |           |
|-----------------|---------|---------|---------|-----------|-----------|
|                 | 1999    | 2002    | 2005    | 2008      | 2009      |
| PhD awardees    | 8,749   | 12,849  | 24,035  | 38,111    | 42,903    |
| PhD students    | 47,649  | 97,220  | 172,052 | 214,963   | 224,119   |
| Master awardees | 41,843  | 63,639  | 157,037 | 293,212   | 314,442   |
| Master students | 170,051 | 376,132 | 760,659 | 1,015,982 | 1,127,285 |

Source: MOE (nd).

power from the state and money from the market. Academics and researchers struggled for survival in the first stage of the market economy in the 1980s by trading and by conducting other knowledge-irrelevant activities outside their normal academic practices. Teaching rather than research was regarded as their major task (Ogden 1982). The teaching–research group (*jiaoyanzu*) as a basic unit to organise university teachers was tasked to achieve better teaching; no concrete or compulsory requirements for research or publication were given to teachers (Han 1993). University service was generally taken as revenue generation to compensate for teachers' low salaries or to support university operational expenditures. It was not until the 1990s, with more public money and research projects allocated to some key universities, that research and publication regained prominence in academic life of Chinese universities.

Moreover, with the expansion of higher education and mission differentiation of different types of universities in the late 1990s and early in new century, the prioritised universities under the state special support schemes, like Project of World-class Universities, stand out as the potential world-class research universities, becoming the top tier of the higher education pyramid (Zha 2009). After them, the stratified higher education system in China is followed by the research–teaching university, the teaching–research university, the teaching university, and lastly the community–vocational college. The practice of National Quality Evaluation of University Undergraduate Teaching (*benke jiaoxue shuiping pinggu*) from 2003 to 2008 helped shape the unintentional stratification among Chinese universities. By and large, the self-positioning or imposed status of a university has changed the assumption and practice of academic work in Chinese universities: the proportion of teaching and research in a university is supposed to follow its positioning.

Along with external pressures, internal personnel reform in universities was led by Peking University in 2003 to change the 'iron-bowl-like' (*tie fanwan*) permanent tenure of academic jobs to an American-style competitive 'up-or-out' tenure-track contract. It stirred up a furious discussion and strong resistance. Finally it was implemented for newcomers and was applied by other universities. As a result, academic job security is reducing and performative indicators dominate the review process of contract renewal and promotion (Lai 2010). Therefore research outputs by quantity and by quantifiable quality are multiplied by pressured academics. Knowledge production is a mission to achieve and a task to fulfill by academics in the changing work culture.

### ***Returned global talents: from brain drain to brain return***

In addition to locally educated students and academics, overseas students and returnees are taken as another important human resource to tap for the knowledge economy (Zweig, Chen, and Rosen 2004). After 1978, students flooded out of China and studied abroad: it was the age of brain drain for China. Now the phenomenon of brain return is becoming visible. The rate of returnees has grown rapidly in the past years. The number of returnees in 2009 is 108,000 persons, which increases by four times than in six years (MOST 2010).

An important policy was issued in 2001 by multiple ministries concerning returnees, aimed at encouraging overseas Chinese to come back to help China's knowledge economy. Universities can use a special fund to invite overseas Chinese academics to exchange or work regularly in China. A series of named projects, like the Thousand Talents Project (*qianren jihua*), Changjiang Scholars (*changjiang xuezhe*), and others (see Cao and Suttmeier 2001) were created to attract globally established academics using financial incentives and honours.



### **Concluding reflections on the role of Chinese universities in the knowledge economy: what are the effective mechanisms and right incentives?**

In the case of China, knowledge and people are identified as core intellectual capacities from the university to contributing to the knowledge economy. However knowledge cannot be produced nor disseminated without people. Therefore a further and fundamental question posed to the role of Chinese universities in the knowledge economy is what motivates knowledge workers produce knowledge and make innovations in the university and produced by the university. Are mechanisms and incentives effective and right to sustain the university's positive role in the knowledge economy?

#### ***Double-edged supports from the top-down strong state***

In China, research universities and other key universities are all state-owned public institutions, and the state has the power to exert its influence directly and indirectly, through finance, regulation and in other ways. The state dominates and shapes the role of Chinese universities in the knowledge economy. It operates a national strategy to strengthen the innovation system, in which universities hold a position of extreme importance.

With its rapid economic development and accumulation of national wealth, China is able to invest heavily in universities and research. The strong state model is powerful with adequate financial support, but it can be inhibiting for innovation (Baark 2007; Dill and van Vught 2010; Lambert 2010). Choosing the areas to be supported, and creating a competitive mechanism for funding projects, though normal practices elsewhere in the world, are not without problems in China. Two renowned Chinese scientists, as recently returned scholars, openly questioned the effectiveness of the selection mechanism in the absence of trustworthy peer review (Shi and Rao 2010).

Market can fail, but equally the state should realise that not all social activities can be effectively coordinated by power. The logic of knowledge production and innovation is quite different from other activities. With a legacy of socialist economic planning and centralised governance, the Chinese government has been used to regulating and coordinating in a top-down manner. Chinese universities are one salient example of this kind of governance. Academic freedom and institutional autonomy have been controlled by the hand of the state. Instead, the fundamental mechanism of knowledge creation and innovation in the knowledge economy should be what Hayek (1976) proposed: 'spontaneous order' upon freedom, rather than 'regulated order'. A strong state can effectively provide generous funding for researchers and facilities, but it will fail in regulating what knowledge to produce and how to produce it (Dahlman and Aubert 2001; Sun 2002). Without academic freedom or tolerance, innovation is stifled. In this sense, a strong state should restrain itself from unfettered intervention in the academic world.

#### ***Curiosity and right incentives to be respected***

Academics in Chinese universities, like their colleagues elsewhere, embrace the shared idea of scholarship and the need to produce, disseminate and apply knowledge in the knowledge economy. It should be admitted that in periods of financial difficulty, Chinese universities and their academics were distracted for some time by revenue-generating business activities. Higher education marketisation and prevailing academic entrepreneurship have compensated academics financially but cannot motivate them.

The imperatives of output indicators are intimidating threat to force people to produce papers and apply for projects. The technology of performativity used by the state and the

university is powerful and can be effective in boosting the visible outputs signifying their productivity. Currently, academics in Chinese universities are pressured by taxing workloads and output expectations. Young researchers are the most vulnerable group of all.

Furthermore, the values of different types of knowledge from different disciplines vary significantly in the knowledge economy. For example, knowledge from the fields of engineering and management are more immediately applicable than those from humanities, and easier to receive funding to impact industries. These unequal values are, in turn, influencing the internal status and resource allocation among disciplines in universities.

Is money the biggest incentive or threat the effective motivation to drive academics in Chinese universities to produce and apply knowledge? Even academic entrepreneurs in the university would hesitate to agree. In Chinese universities, academics usually complain that they are forced to produce papers and compete for research projects (Chen 2006; Lai and Lo 2007; Lai 2010). Academics usually are genuinely motivated by their passion and curiosity to explore and discover the unknown (Geiger 2004; Tien 2007). This is the principle of uncertainty in the university (Barnett 2000). They might succeed or fail, but they do not expect to be rewarded or punished as a result.

### **Coda**

Beyond the case of Chinese universities, the unique feature of the university in the knowledge economy is not about knowledge as such, but about people with knowledge. However comparatively weak the university may be in knowledge production and application, this long-established institution with its skills and privilege in preparing people with knowledge and credentials will not vanish. Endangered though it may be by other organisations involved in knowledge production, dissemination and application, universities should focus more on the basics of what they can do and fully realise what cannot be done in the influx of embedded cultural contradictions (Delanty 2002, 2003). There is a boundary to what the university can uniquely contribute and achieve in the knowledge economy. Finally, the university has always been a place featured by knowledge but their role should not be mystified or exaggerated in the knowledge economy, even when the alchemy of turning knowledge into wealth makes it tempting to do so.

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### **References**

- Baark, E. 2001. The making of science and technology policy in China. *International Journal of Technology Management* 21, no. 1/2: 1–21.
- Baark, E. 2007. Knowledge and innovation in China: Historical legacies and emerging institutions. *Asia Pacific Business Review* 13, no. 3: 337–56.
- Bai, L. 2006. Graduate unemployment: Dilemmas and challenges in China's move to mass higher education. *The China Quarterly* 185: 128–44.

- Ball, S. 2006. Performativities and fabrications in the education economy: Towards the performative society. In *Education, globalization and social change*, ed. H. Lauder et al., 692–701. Oxford: Oxford University Press.
- Barnett, R. 1994. *The limits of competence. Knowledge, higher education and society*. Buckingham: Open University Press.
- Barnett, R. 2000. *Realizing the university*. Buckingham: SRHE and Open University Press.
- Chen, S.Y. 2006. When universities meet market. PhD diss., The Chinese University of Hong Kong.
- Clark, B.R. 1998. *Creating entrepreneurial university organizations: Pathways of transformation*. Oxford: Pergamon.
- Cao, C., and R.P. Suttmeier. 2001. China's new scientific elite: Distinguished young scientists, the research environment and hopes for Chinese science. *The China Quarterly* 168: 960–84.
- Conroy, R.J. 1989. The role of the higher education sector in China's research and development system. *The China Quarterly* 117: 38–70.
- Dahlman, C.J., and J.E. Aubert. 2001. *China and the knowledge economy: Seizing the twenty-first century*. Washington, DC: The World Bank.
- Delanty, G. 2001. *Challenging knowledge: The university in the knowledge society*. Buckingham: SRHE and Open University Press.
- Delanty, G. 2002. The governance of universities: What is the role of the university in the knowledge society? *The Canadian Journal of Sociology* 27, no. 2: 185–98.
- Delanty, G. 2003. Ideologies of the knowledge society and the cultural contradictions of higher education. *Policy Futures in Education* 1, no. 1: 71–82.
- Department of Development and Planning, MOST. 2009. Analysis of university science and technology activities in 2008. *Statistics Report of Science and Technology* 26. [www.sts.org.cn/tjbg/gdxx/documents/2009/20100223.htm](http://www.sts.org.cn/tjbg/gdxx/documents/2009/20100223.htm).
- Dill, D.D., and F.A. van Vught. 2010. Conclusion. In *National innovation and the academic research enterprises*, ed. D.D. Dill and F.A. van Vught, 527–66. Baltimore: The Johns Hopkins University Press.
- Foray, D., and D. Hargreaves. 2003. The production of knowledge in difference sectors: A model and some hypotheses. *London Review of Education* 1, no. 1: 7–19.
- Geiger, R. 2004. *Knowledge and money*. Stanford, CA: Stanford University Press.
- Gibbons, M., C. Limoges, H. Nowotny, S. Schwartzman, P. Scott, and M. Trow. 1994. *The new production of knowledge: The dynamics of science and research in contemporary societies*. London: Sage.
- Han, Y.M. 1993. A comparison of organizational structures in universities in Australia and China. *Journal of Educational Administration* 31, no. 2: 63–83.
- Hayek, F. 1976. *The road to serfdom*. London: Routledge.
- Hayhoe, R. 1999. *China's universities: 1895–1995: A century of cultural conflict*. Hong Kong: The Comparative Education Research Centre and The University of Hong Kong.
- Hsu, I.C.Y. 1964. The reorganization of higher education in communist China, 1949–61. *The China Quarterly* 19: 128–64.
- Kerr, C. 1995. *The uses of the university*. Cambridge, MA: Harvard University Press.
- Lai, M.H. 2010. Challenges to the work life of academics: The experience of a renowned university in the Chinese Mainland. *Higher Education Quarterly* 64, no. 1: 89–111.
- Lai, M.H., and N.K. Lo. 2007. The changing work lives of academics: The experience of a regional university in the Chinese Mainland. *Higher Education Policy* 20, no. 2: 145–67.
- Lambert, B.H. 2010. Impediments, inhibitors, and barriers to university entrepreneurialism. In *Entrepreneurialism in universities and the knowledge economy*, ed. M. Shattock, 142–82. Maidenhead: Open University Press.
- Levin, H., and Z. Xu. 2006. Issues in the expansion of higher education in the People's Republic of China. In *Education, globalization and social change*, ed. H. Lauder et al., 620–41. Oxford: Oxford University Press.
- Lo, L.N.K., and S.Y. Chen. 2004. The role of market in China's mainland higher education reforms since 1990s. *Educational Research* 10: 33–7. (In Chinese.)
- MOE (Ministry of Education). n.d. China's educational statistics. [www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s4628/list.html](http://www.moe.edu.cn/publicfiles/business/htmlfiles/moe/s4628/list.html).
- MOST (Ministry of Science, Technology, PRC). 2004. *China S&T statistics data book*. Beijing: Department of Development Planning of Ministry of Science and Technology.
- MOST (Ministry of Science and Technology, PRC). 2010. *China S&T statistics data book*. Beijing: Department of Development Planning of Ministry of Science and Technology.

- OECD. 2008. OECD factbook 2008: Economic, environmental and social statistics. <http://puck.source-oecd.org/vl=3105018/cl=11/nw=1/rpsv/factbook/070101.htm>.
- Ogden, S. 1982. Higher education in the People's Republic of China: New directions in the 1980s. *The China Quarterly* 11: 85–109.
- Powell, W.W., and K. Snellman. 2004. The knowledge economy. *Annual Review of Sociology* 30: 199–220.
- Santiago, P., K. Tremblay, E. Basri, and E. Arnal. 2008. *Tertiary education for the knowledge society*. Paris: OECD.
- Shi, Y.G., and Y. Rao. 2010. China's research culture. *Science* 329, no. 5996: 1128.
- Simon, D.F. 1989. China's drive to close the technological gap: S&T reform and the imperative to catch up. *The China Quarterly* 119: 598–630.
- Slaughter, S., and L.L. Leslie. 1997. *Academic capitalism: Politics, policies and the entrepreneurial university*. Baltimore: Johns Hopkins University Press.
- Slaughter, S., and G. Rhoades. 2004. *Academic capitalism and the new economy: Markets, state and higher education*. Baltimore: The Johns Hopkins University.
- Sun, Y.F. 2002. China's national innovation system in transition. *Eurasian Geography and Economics* 43, no. 6: 476–92.
- Tien, F.F. 2007. Faculty research behavior and career incentives: The case of Taiwan. *International Journal of Educational Development* 27: 4–17.
- Yang, R., L. Vidovich, and J. Currie. 2007. 'Dancing in the cage': Changing autonomy in Chinese higher education. *Higher education* 54: 575–92.
- Yin, Q., and G. White. 1994. The 'marketisation' of Chinese higher education: A critical assessment. *Comparative Education* 30, no. 3: 217–38.
- Zha, Q. 2009. Diversification or homogenization: How governments and markets have combined to (re)shape Chinese higher education in its recent massification process. *Higher education* 58: 41–58.
- Zweig, D., C. Chen, and S. Rosen. 2004. Globalization and transnational human capital: Overseas and returnee scholars to China. *The China Quarterly* 179: 735–57.